Contents

Section 5

Uintah Basin Plan

Water Supply and Use

The primary feature of this hydrologic system is the Green River. All of the streams in this basin flow into the Green River.

5.1 Introduction

Most of the water used in the basin is for agricultural, municipal and industrial purposes and comes from streams originating in the Uinta Mountains. Water is stored for use in Long Park, Strawberry, Starvation, Currant Creek, Upper Stillwater, Big Sand Wash, Moon Lake, Steinaker, Red Fleet reservoirs and many other small reservoirs. Figure 5-1 shows the major rivers, streams and water impoundments. Figures 5-2 and 5-3 show the quantity of flows into, through and out of the Uintah Basin.

Steinaker Reservoir

5.2 Background

Population growth and development of the basin's natural resources have brought an increase in water demand. This demand is being met by the combined efforts of irrigation companies, cities and water conservancy districts. Federal and state agencies have played a prominent role in constructing water storage and delivery facilities.

5.3 Water Supply

The water delivery systems range from simple to complex. Major aqueducts and large storage reservoirs enhance most irrigation and municipal systems. Small systems consisting of pumps and earthen ditches have also been developed. Table 5-1 shows average annual stream flows for the Uintah Basin.

5.3.1 Surface Supply[164,4]

The Green River is the largest river in the Uintah Basin. The Duchesne and White rivers are large tributaries flowing into the Green River. The Yampa also flows into the Green River from Colorado, with its headwaters in the Colorado Rockies.

Numerous lakes are near the crest of the Uinta Mountains. Forty-seven of these small, natural lakes have been fitted with dams and outlet works and now function as storage reservoirs. The combined regulated capacity of these lakes is about 17,000 acre-feet. Most of these reservoirs were constructed in the early 1900s by local irrigation companies. Fifteen of these lakes will be stabilized (constant water level) as part of the Central Utah Project Completion Act, if the reduced Uintah and Upalco units are constructed, and will be used for fish, wildlife and other recreational purposes. Flaming

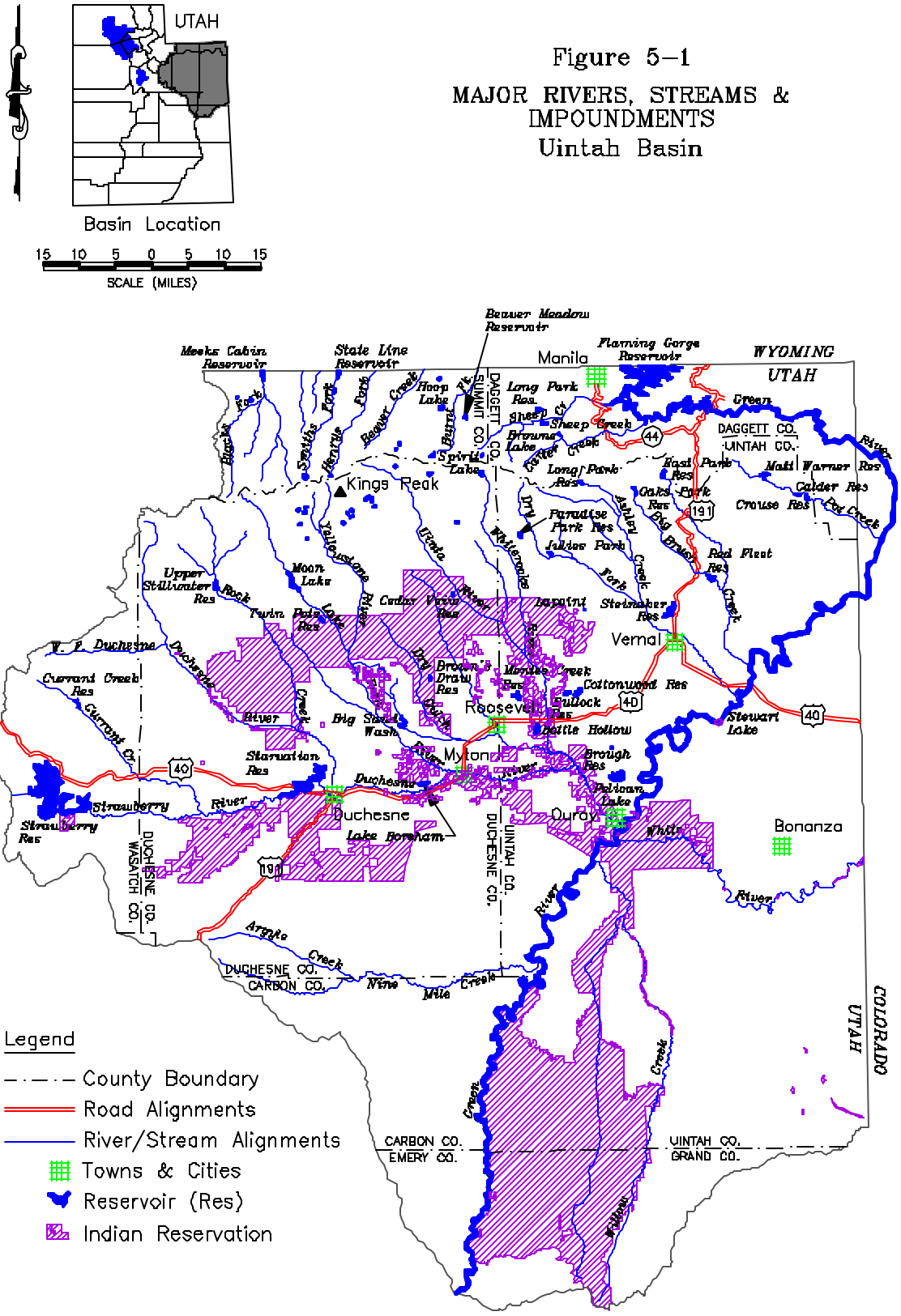
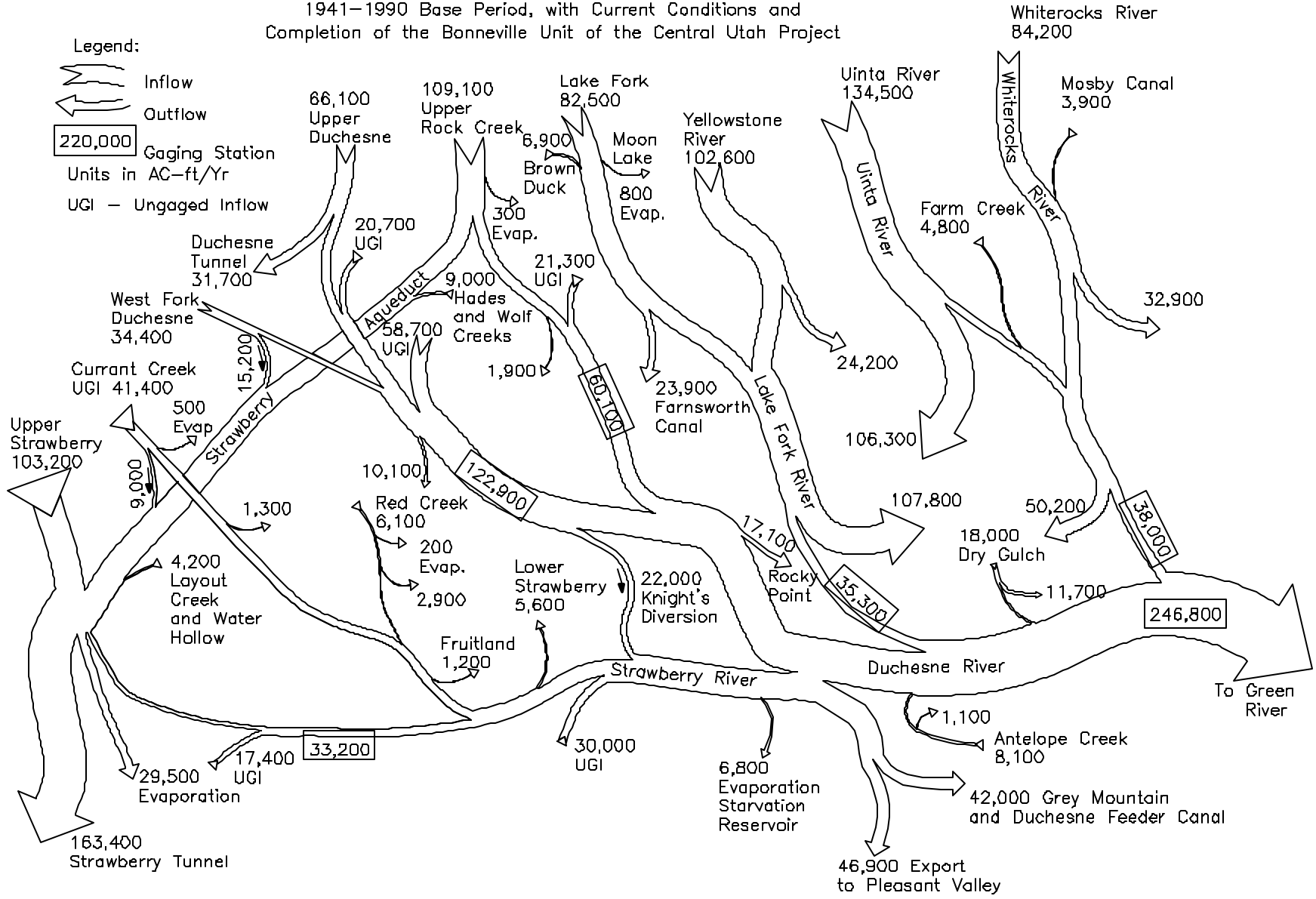

UTAH
Basin Location
15 10 5 0 5 10 15
SCALE (MILES)
Figure 5-1
MAJOR RIVERS, STREAMS & IMPOUNDMENTS
Uintah Basin
Beaver Meadow Reservoir
Meeks Cabin Reservoir
State Line Reservoir
Manila
Flaming Gorge Reservoir
WYOMING
UTAH
Kings Peak
DAGGETT CO.
UINTAH CO.
SUMMIT CO.
Vernal
Roosevelt
Myton
Duchesne
Duray
Bonanza
DUCHESNE CO.
WASATCH CO.
CARBON CO.
EMERY CO.
GRAND CO.
COLORADO
Legend
County Boundary
Road Alignments
River/Stream Alignments
Towns & Cities
Reservoir (Res)
Indian Reservation

Figure 5–2
Duchesne River System
Average Annual Streamflow and Stream Depletion Chart
1941–1990 Base Period, with Current Conditions and
Completion of the Bonneville Unit of the Central Utah Project



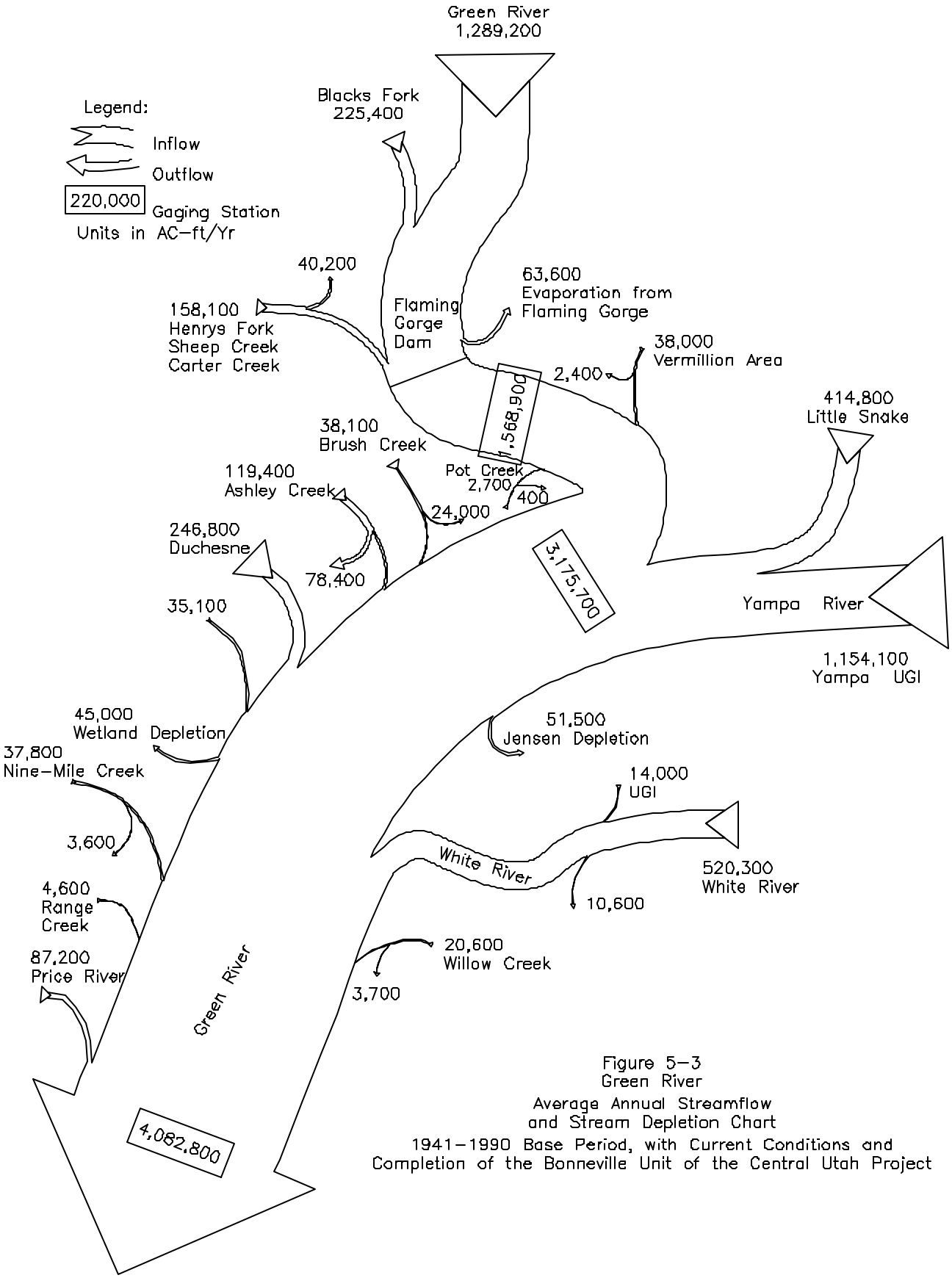


Figure 5-3
Green River
Average Annual Streamflow
and Stream Depletion Chart
1941-1990 Base Period, with Current Conditions and
Completion of the Bonneville Unit of the Central Utah Project

Gorge Reservoir, constructed by the Bureau of Reclamation, provides water storage, power generation and recreation. Strawberry, Starvation, Currant Creek, Upper Stillwater, Steinaker, Bottle Hollow and Red Fleet reservoirs are Central Utah Project (CUP) reservoirs that provide storage for municipal, industrial, agricultural and recreational water uses.

Municipal and industrial (M&I) water for the Bonneville Unit of the CUP is exported to the Wasatch Front from Strawberry Reservoir through the Syar Tunnel. It is released to Utah Lake and exchanged to Jordanelle Reservoir for use in northern Utah County and Salt Lake County.

Strawberry Valley Project water from Strawberry Reservoir is used for irrigation in southern Utah County. The Provo River Project exports water from the Duchesne River drainage to the Provo River through the Duchesne Tunnel. This water is stored in Deer Creek Reservoir for use in Utah and Salt Lake counties.

Developed water supply in the Uintah Basin is 811,380 acre-feet per year. Table 5-2 shows presently developed water supplies by sub-unit. Bonneville Unit water (101,900 acre-feet), which is part of the 811,380 acre-feet, will be exported to the Wasatch Front through the transbasin diversion Syar Tunnel which diverts from the Strawberry Reservoir.

Major Springs[61] - Many of the major springs are connected to surface flow by a karst system of underground tunnels, which includes the sinks on Ashley and Brush creeks. Water flows down the creek, disappears into a system of sink holes or caves, then reappears as large springs farther down the creek or in adjacent drainages. The large Ashley Spring on Ashley Creek is an example.

The lower valleys, such as Ashley Valley, contain relatively few springs and wells, almost all of which are of a low yield and used for domestic or stock supply purposes or irrigation of small garden tracts.

Further information on the basin's groundwater is found in Section 19 - Groundwater.

Cattle in the basin

5.3.2 Groundwater Supply[1,143,148,55]

Tributary groundwater inflow is a part of the total water supply. A 1970 hydrologic inventory of the Uintah study unit by the Utah Water Research Laboratory estimated about 8 to 16 percent of the total tributary inflow occurs as groundwater. The proportion varies from one area to another. About 35,000 acre-feet of groundwater originate on the south slope of the Uinta Mountains and 91,000 acre-feet on the north slope each year. The groundwater seeps into the streams through the alluvium and topsoil and may be used, and reused, as it drains to the Green River. Primary use of groundwater in this basin is for M&I use.

5.4 Water Use

Starvation Reservoir supplies 500 acre-feet per year of municipal and industrial water for the city of Duchesne.[89]

Steinaker Reservoir supplies about 1,600 acre-feet per year of municipal and industrial water to Vernal City, Ashley Valley and Maeser, along with water from Ashley Creek. Water is also pumped from Red Fleet Reservoir through a conveyance system to the water treatment plant in Vernal.

Most smaller cities obtain water from springs or creek diversions. Flaming Gorge Dam and Reservoir were completed in 1964, but only Dutch John

Table 5-1
Average Annual Streamflows at Gaging Stations

Gage No.	Station	Years of Record	Acre-Feet
9-2320	Sheep Creek near Manila[1]	1944-61	8,690[2]
9-2330	Carter Creek near Manila	1949-54	6,750
9-2340	Carter Creek at mouth near Manila	1947-55	110
9-2356	Pot Creek above diversion near Vernal	1958-90	2,800
9-2605	Jones Hole Creek near Jensen	1951-56	26,640
9-2615	Brush Creek above cave near Vernal[3]	1947-54	10,310[4]
9-2617	Big Brush Creek above Red Fleet Reservoir	1979-90	31,730
9-2620	Brush Creek near Vernal[3]	1940-65	24,470
9-2625	Little Brush Creek below East Park Res. near Vernal	1950-55	9,630
9-2630	Little Brush Creek near Vernal	1946-52	14,410
9-2640	Ashley Creek below Trout Creek near Vernal	1944-55	17,450
9-2645	South Fork Ashley Creek near Vernal	1944-55	14,410
9-2653	Ashley Creek above Red Pine Creek near Vernal	1965	70,530
9-2655	Ashley Cree above Springs near Vernal	1942-45	49,530
9-2665	Ashley Creek near Vernal[5]	1913-90	71,940
9-2680	Dry Fork above Sinks near Dry Fork	1940-65	25,850
9-2685	North Fork Dry Fork near Dry Fork	1947-65	4,410
9-2689	East Fork of Dry Fork above Sinks near Dry Fork[6]	1961-65	8,330
9-2690	East Fork of Dry Fork near Dry Fork	1947-63	5,770
9-2700	Dry Fork below Springs near Dry Fork	1942-65	20,780
9-2705	Dry Fork at mouth near Dry Fork	1955-65	15,420
9-2730	Duchesne River at Provo River Trail near Hanna	1945-54	41,340
9-2732	Duchesne River below Little Deer Creek near Hanna	1965	67,650[7]
9-2735	Hades Creek near Hanna	1950-65	6,400
9-2740	Duchesne River near Hanna	1922-60	56,472
9-2749	W. Fork Duchesne Riv. below Vat Diversion near Hanna	1989-90	6,700
9-2755	West Fork Duchesne River near Hanna	1923,46-90	36,150
9-2760	Wolf Creek at Rhodes Canyon near Hanna	1946-65	5,280
9-2780	South Fork Rock Creek near Hanna	1954-90	9,930

Table 5-1 (Continued)
Average Annual Streamflows at Gaging Stations

Gage No.	Station	Years of Record	Acre-Feet
9-2785	Rock Creek near Hanna	1950-65	110,000
9-2790	Rock Creek near Mountain Home	1938-90	126,800
9-2804	Hobble Creek at Daniels Summit near Wallsberry	1965	2,270
9-2855	Willow Creek near Soldier Summit	1944-47	3,870
9-2875	Water Hollow near Fruitland	1947-65	4,000
9-2815	Cottonwood Creek near Fruitland	1965	17,030
9-2889	Sowers Creek near Duchesne	1965	5,010
9-2895	Lake Fork above Moon Lake near Mountain Home	1934,43-55 1964-90	81,140
9-2900	Brown Duck Creek near Mountain Home	1934,43-55	6,830
9-2910	Lake Fork below Moon Lake near Mountain Home	1943-90	92,740
9-2915	Yellowstone Creek below Summit Creek near Altonah	1950-56	86,880
9-2925	Yellowstone Creek near Altonah	1945-90	100,700
9-2955	Uinta River below Gilbert Creek near Neola	1951-55	28,810
9-2960	Uinta R above Clover Creek near Neola	1946-55	102,800
9-2965	Clover Creek near Neola	1951-55	1,390
9-2980	Farm Creek near Whiterocks	1950-65	4,170
9-2985	Whiterocks River above Paradise Creek near Whiterocks	1946-55	71,170
9-2990	Paradise Creek near Whiterocks	1947-55	5,090
9-2995	Whiterocks River near Whiterocks	1900-90	88,390
9-3020	Duchesne River near Randlett	1942-90	423,800
9-3075	Willow Creek above diversion near Ouray	1951-65	13,180
9-3085	Minnie Maud Creek near Myton	1951-65	3,350

[1]Canal diversion to Sheep Creek.
[2]Since 1954 receives water from Carter Creek Canal.
[3]Oaks Park Canal diversion to Ashley.
[4]Adjusted to include flow in Oaks Park Canal.
[5]Contains water from Oaks Park Canal since 1941.
[6]Does not include flow diverted from Mosby Canal.
[7]Includes flow diverted through Duchesne Tunnel.

Source: USGS Daily Values by Earthinfo Inc. Westone - 1994

Table 5-2 Presently Developed Water Supplies	
Sub-Unit	Total Diversions
Upper Green	51,210
Ashley/Brush	88,840
Duchesne/Strawberry	543,760
Green	121,480
White	6,090
Total	811,380
Source: Water Budget Report for the Uintah Basin, Utah Division of Water Resources	

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receives municipal and industrial water from a filtration plant at the reservoir.

5.4.1 Agricultural Water Use

The largest use of surface water is for irrigation. Annual diversions have averaged about 797,610 acre-feet for approximately 201,120 acres. The total depletion of agricultural water is 411,310 acre-feet. Table 5-3 summarizes irrigation water use. Section 10 provides more detail.

5.4.2 Municipal and Industrial Water Use[57]

Municipal and industrial water diversions average about 13,770 acre-feet per year. This category includes water used in homes, businesses and industry. It also includes culinary water used to irrigate lawns and gardens, golf courses, parks, school yards and other outdoor areas. Industrial diversions, including power plants, have ranged up to 11,830 acre-feet per year. Table 5-4 shows the current usage.

5.4.3 Secondary Water Use

Water from secondary systems is used to irrigate lawns, gardens, parks, cemeteries and golf courses. These systems deliver untreated water and may be owned and operated by municipalities, irrigation companies, special service districts and others. Most cities have pipe systems serving a portion of their residents. Some have pressurized irrigation systems only on specific areas such as golf courses or large parks. Estimated diversions for 1996 are shown in Table 5-5.

5.4.4 Wet and Open Areas

Wet and open areas occur around Strawberry Reservoir and Stewart and Pelican lakes, Pariette Wetlands, along rivers, and near other streams, springs, bogs, wet meadows, lakes and ponds. Riparian lands display a great diversity of vegetation and wildlife species.

5.4.5 Minimum Instream Flows

Instream flows are primarily non-consumptive and contribute to the aquatic ecosystem and quality of life. The minimum instream flow for the lower Duchesne River is being negotiated by the federal and state wildlife services, the Bureau of Indian Affairs, Central Utah Water Conservancy District and the Ute Indian Tribe. The new Duchesne County Water Conservancy District expects to be part of the negotiations. The U.S. Fish and Wildlife Service is analyzing flows necessary to protect the endangered fish in this section of the Duchesne River. Figure 5-4 shows minimum instream flows for the Uintah Basin.

Table 5-3
Irrigation Water Use (1994)

Hydrologic Study Area	Area (acres)	Diversions[1] (acre-feet)	Depletions (acre-feet)
Upper Green	14,090	50,540	22,800
Ashley-Brush	22,510	82,570	57,700
Duchesne/Strawberry	143,040	537,100	287,940
Green	20,450	121,310	40,980
White	1,030	6,090	1,890
Total	201,120	797,610	411,310

[1]Some diversions consist of return flows from other diversions.
Source: Water Budget Report of the Uintah Basin, Utah Division of Water Resources

Table 5-4
1996 Municipal and Industrial Culinary Water Diversions (AC-FT/YR)

Description	County Daggett	Duchesne	Uintah	Total
Residential				
Public Community Systems	380	1,650	4,440	6,470
Public Non-Community Systems	0	10	10	20
Private Domestic Systems	20	560	300	880
Total	400	2,220	4,750	7,370
Commercial/Institutional				
Public Community Systems	100	580	1500	2,180
Public Non-Community Systems	10	20	20	50
Total	110	600	1,520	2,230
Industrial				
Public Community Systems	10	690	320	1,020
Self-Supplied Industries	0	40	3,770	3,810
Coal-Fired Power Plant (Deseret)	0	0	7,000	7,000
Total	10	730	11,090	11,830
Total Municipal & Industrial Diversions	520	3,550	17,360	21,430

Table 5-5 1996 Estimated Secondary Water Use[a] (ac-ft)	
County	Diversions
Daggett	70
Duchesne	1,050
Uintah	1,380
Total	2,500
[a]Does not include industrial use.	

5.4.6 Other Use

A major non-consumptive use of water in the Uintah Basin is recreation. State parks are located at Red Fleet, Starvation and Steinaker reservoirs. Flaming Gorge Reservoir is managed by the USDA Forest Service as part of the Flaming Gorge National Recreation Area. Other sites managed by the Forest Service are at Strawberry, Currant Creek and Upper Stillwater reservoirs. Boating, waterskiing, fishing and camping opportunities draw thousands of visitors annually. This aspect of water use is explained in detail in Section 15.

Hydroelectric power generation also uses basin water. Four hydro-generating power plants have a collective installed capacity of 149,950 kw -- Flaming Gorge Reservoir has 145,850 kw, and the small Uinta, Yellowstone and Sand Wash power plants have a total of 4,100 kw. Deseret Generation and Transmission Cooperative (DG&T), which operates a coal-fired plant, has a generating capacity of 450 megawatts. Section 18 provides additional information on hydropower and coal-fired generated power.

5.5 Interbasin Diversions

Water is exported from this basin west to the Bonneville Basin through the Duchesne Tunnel, the Daniels Creek diversion and the Syar (Strawberry) Tunnel.

5.5.1 Imports

About 1,350 acre-feet of water annually are imported into the North Fork of the Ashley Creek drainage from the north slope of the Uinta Mountains (Leidy Peak).

5.5.2 Exports and Outflow

The major interbasin diversions for the Uintah Basin are shown by Figure 5-5. In the spring of 1882, water was diverted from the upper tributaries of the Strawberry River to Daniels Canyon in Wasatch County through three small canals. Not enough water was available to increase this diversion by gravity flow, so a 1,000-foot tunnel was excavated through the mountain. This allowed additional water to be diverted from the Strawberry River drainage to Daniels Canyon.

The Strawberry Valley Project diverts water from the Uinta Basin into the Bonneville Basin and is one of the earliest federal reclamation projects. Water was collected in the 270,000 acre-foot active capacity Strawberry Reservoir formed by a dam on the Strawberry River, a tributary of the Duchesne River. Feeder canals brought additional water to the reservoir from Indian and Currant creeks. The Strawberry Tunnel, which is 3.7 miles long, extends from Strawberry Reservoir to Sixth Water Creek. Sixth Water Creek is tributary to Diamond Fork, which empties into the Spanish Fork River. Historically, 61,500 acre-feet annually have been delivered through the Strawberry Tunnel to the Spanish Fork River and used for irrigation in the southern portion of Utah Valley. When the Bonneville Unit of the Central Utah Project is in full operation, annual exports from Strawberry Reservoir will increase to 163,400 acre-feet. Table 5-6 shows the major exports from the Uintah Basin.

The Duchesne Tunnel, part of the Provo River Project, diverts an average of 31,700 acre-feet of water from the North Fork of the Duchesne River, a tributary of the Green and Colorado rivers. The tunnel begins in the North Fork of the Duchesne River 21 miles due east of Kamas and extends six miles under a spur of the Uinta Mountains. It then discharges into the main stem of the Provo River upstream from Kamas. The Duchesne Tunnel was completed in 1953 and began delivering water for

the irrigation season of 1954. Its capacity is 600 cfs and is dependent upon rights to surplus water for its diversions. More than 70 percent of the annual flow of the North Fork occurs during May, June and July. ❑

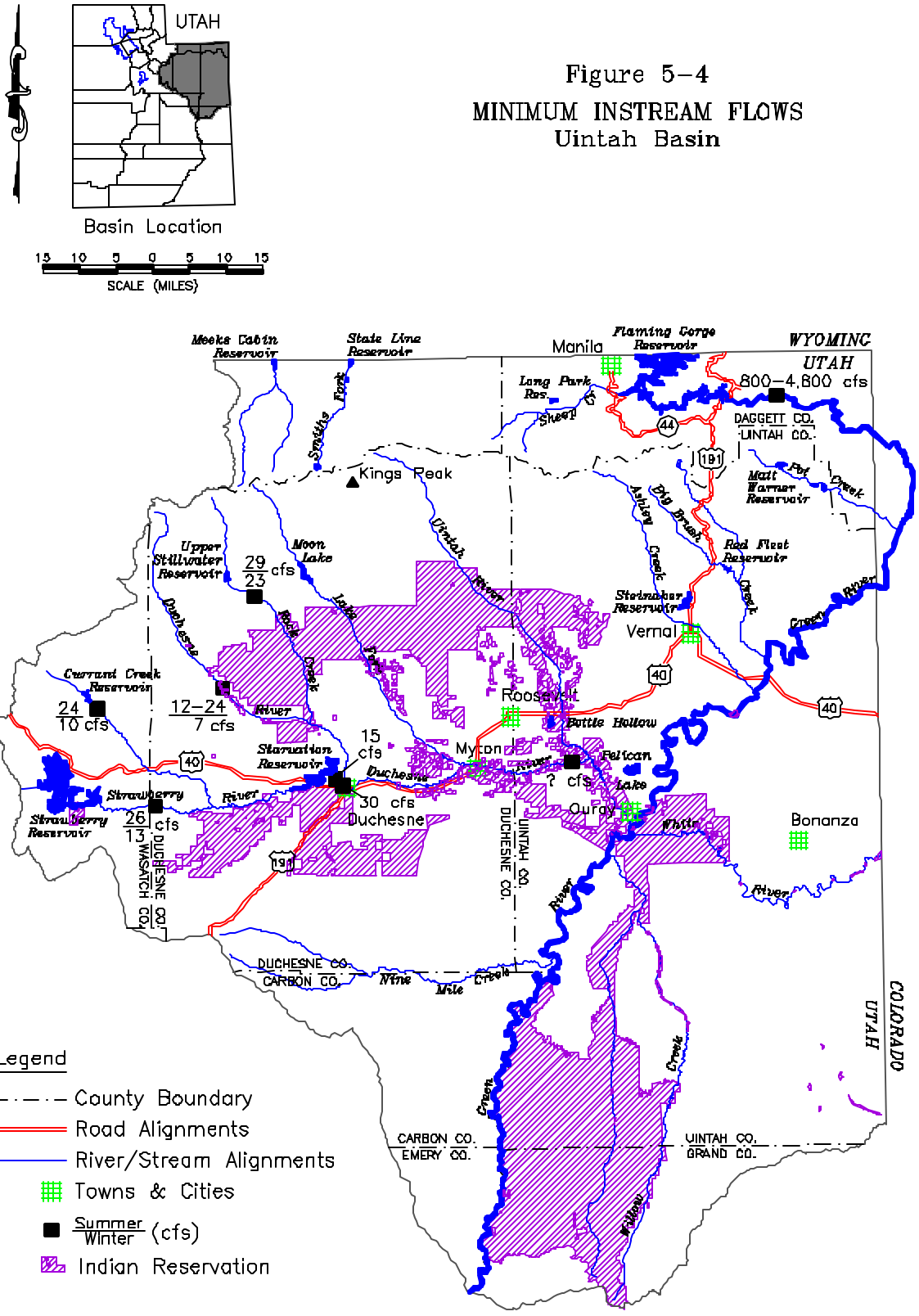

Figure 5–4
MINIMUM INSTREAM FLOWS
Uintah Basin

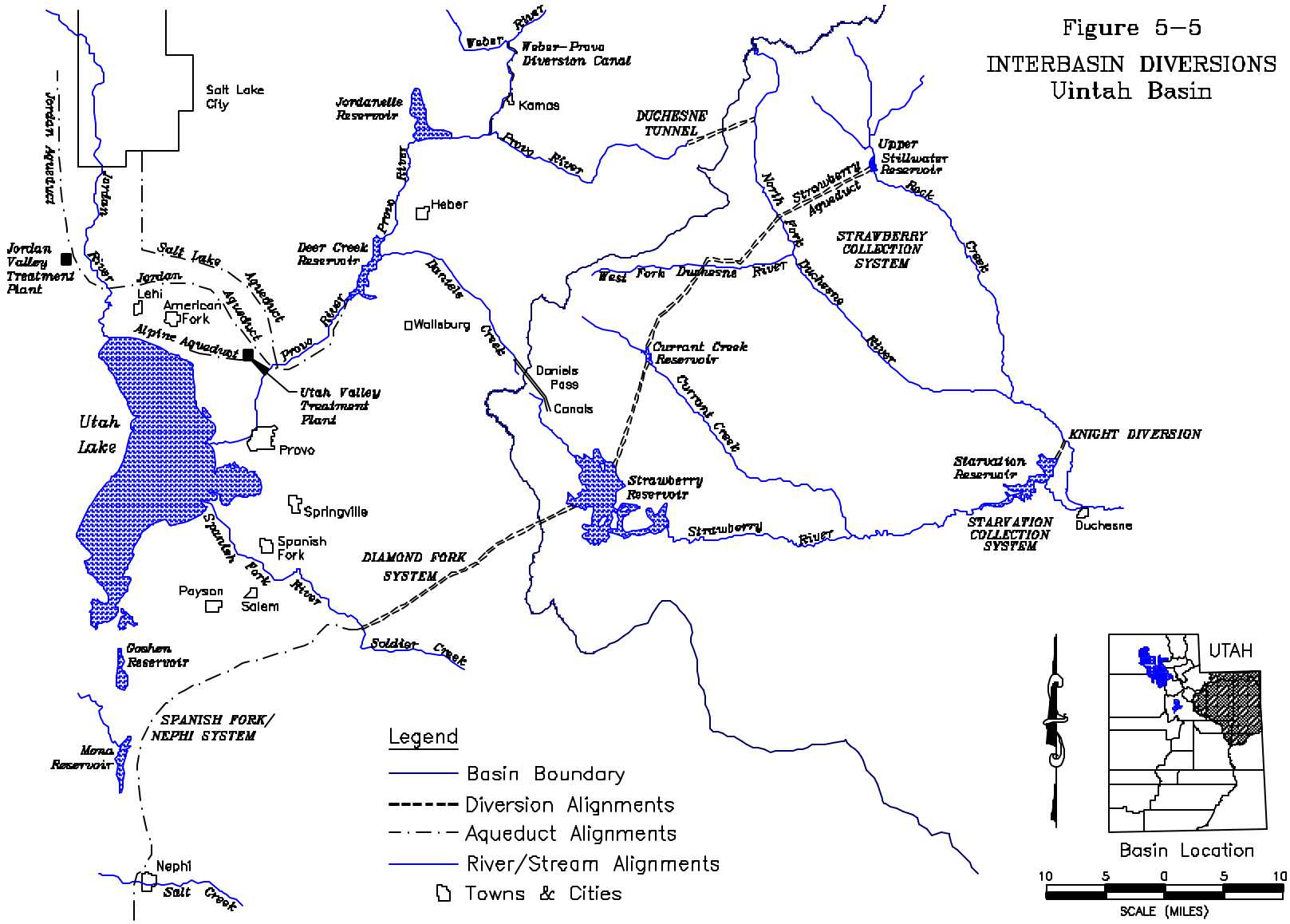

Figure 5–5

INTERBASIN DIVERSIONS
Uintah Basin

Table 5-6
Interbasin Diversions

Source Basin	Source/Stream	Conveyance	Receiving Stream/Facility	Operator	Flow Capacity (cfs)	Average Annual Depletion (ac-ft)
Exports						
Uinta	Strawberry River	Strawberry/Willow Cr. Canal, Hobble Creek Ditch	Daniels Creek	Daniels Irrigation Co.	30/12	2,900[a]
Uinta	Strawberry River	Strawberry Tunnel	Sixth Water (Diamond Fork) Spanish Fork	Strawberry Water Users Assoc.	460	61,500
Uinta	Duchesne Tributaries	Strawberry Collection System	Diamond Fork	CUWCD	600	101,900[b]
Uinta	Duchesne River (North Fork)	Duchesne Tunnel	Provo River	Provo River Water Users Assoc.	600	31,700
	Reservoir Evaporation					30,300[c]
Total						228,300
Imports						
Lucerne	North Slope Uinta Mtns. (Leidy Peak)	Two canals	North Fork Ashley Creek	Highline Irrigation Co.	50	1,350

[a]The diversion will end when the Wasatch County Water Efficiency Project/Daniels Replacement Pipeline (WCWEP/DRP) is completed.
[b]Total potential diversion when CUP is completed and demand requires.
[c]Evaporation from reservoir surfaces.